REMARKS

The following remarks are in response to Final Office Action dated April 13, 2004. As reflected above, claims 1, 6-20, 22-26, 31-45 and 47-50 are now pending in this application.

Claims 1, 6-11, 17-19, 22-24, 26, 31-36, 42-44, and 47-49 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Rybicki et al. (US 6,212,230 B1) in view of McCorkle et al. (U.S. 2003/0053555 A1) and further in view of Cassia et al. (US 5,987,068).

Relying on three separate references, Rybicki et al., McCorkle et al., and Cassia et al., the Action attempts to make a prima facie case for obviousness by arguing that the combined teachings of these references some how teach each and everyone of the claimed limitations of the invention. Applicant respectfully disagrees, because as explained below, the rejection under the Action amounts to an improper use of hindsight where the invention is used as a template for piecing together the prior art for the obviousness rejection.

As claimed, the present invention relates to specifying pulse characteristics using codes in order to define a communication channel over which information is communicated, i.e., received or transmitted. The information may correspond to data bits (or any other type of information attribute) that are modulated onto the communication channel. It is important to note that in the claimed invention, the pulse characteristics are

used for channelization and not for modulation of information. Usually, communication channels are usd as paths or routes for communicating modulated information.

More specifically, a code under the invention has a code element value that represents a non-temporal pulse characteristic of a pulse. The code element value is associated with the non-temporal pulse characteristic that defines a communications channel such that the non-temporal characteristic comprises at least one of a pulse width characteristic, a pulse amplitude characteristic, and a pulse type characteristic. It should be noted that the claimed requirements for the non-temporal characteristic being one of a pulse width characteristic, pulse amplitude characteristic, and pulse type characteristic are mutually exclusive. In other words, for channelization, the non-temporal characteristic can be any one of, or a combination of, pulse width characteristic, pulse amplitude characteristic, and pulse type characteristic.

Rybicki et al. teach a modulation method and apparatus intended to achieve "higher data transmission rates than the 4 Mbps of the IrDA standard but utilizes commercial grade LEDs and LRDs." Rybicki et al. disclose encoders that modulate the position, amplitude, or width of pulses so as to encode information based on the values of a set of data bits of a digital data stream in accordance with a selected encoding convention that relates (or maps) different sets of bits to different pulse pattern/pulse amplitude combinations. Consequently, Rybicki et al. teaches an information modulation technique, not a channelization technique.

More importantly, Rybicki et al. do not teach generating a code that defines a communications channel. Instead, Rybicki et al. teach a modulation method for encoding information. As is well known in the art, creating communication channels is not the same as modulating information. It should be emphasized that channelization and modulation are generally viewed in the art of telecommunication as separate and independent processes. In fact, careful reading of Rybicki et al. illustrates that modulation of information is not the same as channelization. Col. 4, Lines 61-65 of Rybicki et al. states "[t]he transmitted modulated pulses 28 are communicated to the demodulator 12 via the infra red transmission path 32, which may be a wireless path, (e.g., a communications path between a remote control device and a controlled device) or a fiber optics transmission path." (Emphasis added) Furthermore, in Col. 5, Lines 14-19, Rybicki et al. states "[a]s one of average skill in the art will appreciate, the modulation and demodulation, or the encoding and decoding, of data in accordance with the present invention may also be applied to RF transmissions, such that the IR transmission path 32 is replaced with an RF transmission path." These statements clearly indicate that Rybicki et al. teach modulation of information as a separate process from channelization.

Citing Figure 4 of Rybicki et al. and other sections, the Action states that this reference teaches a codes with code element values that are associated with amplitude and pulse width. However, unlike the present invention, Rybicki et al. do not teach a code generator that generates a code for defining a communications channel. In fact, the sets of bits shown in Figure 4 of Rybicki et al. are not codes, at least not in the context

that is defined by the present invention for channelization. Rather, Figure 4 of Rybicki et al. represent possible combinations of four bits of a digital data stream. As such, the values of the bits of the sets of bits are not code element values. The mapping of bit values to pulse patterns and pulse amplitudes shown in Figure 4 does not correspond to code generation. Instead, the mapping defines the different sets of bits that are encoded by different combinations of pulse pattern modulation/pulse amplitude (or width) modulation. As stated above, in Rybicki et al., the communication channel is defined by the frequency of the underlying carrier of the transmission path. Thus, Rybicki et al. do not teach or suggest a code that defines a communication channel. Rather, Rybicki et al. teach a modulation method for encoding information that can use an available communication channel including an IR communications channel, wireless communications channel, or a fiber optics communications channel.

As the basis for the obviousness rejection, the Action first combines the teachings of Rybicki et al. with McCorkle et al. McCorkle et al. teach communicating information "through the use of inverted or non-inverted copies" of wavelets. This process is known in the art as biphase, or flip, modulation. As can be seen in Figure 4 of McCorkle et al., a '0' bit can be communicated via a non-inverted wavelet and a '1' bit can be communicated via an inverted wavelet. McCorkle et al. disclose "transmission of codes built from time shifted and inverted replicas of short RF pulses." In page 4, paragraph 0071, McCorkle et al disclose use of "pulse codes for integration gain, channelization, whitening, and notch filtering [where the] pulse coded transmit signal is formed from

shifted (time hopped) and inverted (biphase) copies of the underlying ultrawideband short pulse" According to McCorkle et al. "in this system the data are transmitted by biphase modulation of codes rather than modulation of a carrier" (See page. 6, paragraph 0100). In short, McCorkle et al. produce a sequence of pulse in accordance with a pattern defined by a code where the coded sequence of pulses defines a communications channel and the pattern is inverted or not as modulated by an information signal.

Examiner contends that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rybicki et al.'s impulse communication system with McCorkle et al.'s teaching of using inverted or non-inverted copies of code information, since McCorkle et al. suggest that the result of this modulation would help to generate larger collections of codes." Applicants respectfully disagree with the combination because one of ordinary skill in the art would have no motivation to combine these references.

First, the fact that biphase coding approach of McCorkle et al. can generate a large collection of codes in no way suggests how the inverted or non-inverted copies of code information of McCorkle et al. can be used in Rybicki et al.'s system or in any way suggests how the two approaches can be combined. In other words, as explained in more detail below, the Action has not set forth any motivation for combining a pulse-based "carrier less" communication system as disclosed by McCorkle et al. with a "carrier-based" communication system as disclosed by Rybicki et al. In fact, the Action has not stated any reason for how such combination could even be enabled without undue

experimentation. As such, the motivation for combining Rybicki et al. and McCorkle et al. appears to be the result of improper use of hindsight by the Examiner.

It is respectfully submitted that Rybicki et al. and McCorkle et al. are so unrelated that one of ordinary skill in the art would not find any motivation to combine them. Even if an attempt in combining these references is made, the Action has not stated how such combination is enabling. For instance, Rybicki et al. teach a modulation method that can be used with an available communications path (or channel), where each of the "communications paths" taught by Rybicki et al. involve an underlying carrier signal upon which the pulses are modulated. In contrast, McCorkle et al. specifically teach "modulation of codes rather than modulation of a carrier" (See page 6, paragraph 0100). Thus, McCorkle et al. teach transmission of pulses without a carrier, while Rybicki et al. teach transmission of pulses modulated onto a carrier. In fact it can be argued that because McCorkle et al. use codes rather than a carrier, they teach away from combining their system with a carrier-based system.

McCorkle et al. use a coded sequence to define a channel, whereas Rybicki et al. can use a carrier-based channel. Furthermore, McCorkle et al. teach biphase modulation of entire coded sequences of pulses, whereas Rybicki et al. teach modulation of individual pulses. Moreover, it is not clear how one of ordinary skill in the art could modify Rybicki et al. to replace the disclosed individual pulses with the biphase coded pulse sequences of McCorkle et al. McCorkle et al. teach inverting or not inverting entire sequences of evenly spaced biphase modulated pulses whereas Rybicki et al. teach using

different pulse position patterns combined with amplitude (or width) modulation to represent different sets of data bits. It is respectfully submitted that any one of the above stated reasons would prevent one of ordinary skill in the art from combining Rybicki et al. with McCorkle et al.

Going further down the path of improper use of hindsight, the Action combines Rybicki et al. and McCorkle et al with Cassia et al. Cassia et al. disclose a radio communication system having enhanced communication capability that maintains standard channel modulation compatibility. According to Cassia et al., a first information signal is generated from data according to a predefined standard modulation scheme, and a second information signal is generated from data that provides supplemental information to the standard modulated data. In col. 3, Lines 18-23, Cassia et al. state that the first and second information signals are combined into a composite signal transmitted on a radio frequency communications channel. The composite signal represents the first information signal when interpreted according to the predefined standard modulation scheme. Accordingly, similar to Rybicki et al., Cassia et al teaches a modulation method in a carrier based system, with the difference being that Cassia et al. use two separate information signals, whereas Rybicki et al. uses a single information signal for modulation. For all of the reasons stated in connection with lack of motivation for combining a carrier-based system, such as Cassis et al. or Rybicki et al., with a carrier-less system, such as McCorkle, it is respectfully submitted that the combination of references as set forth in the Action is improper.

Applicants agree with the Examiner that "Cassia et al. teach use of orthogonal pulse shapes for the purpose of transmitting supplemental data over a frequency channel." Cassia et al. further teach "The standard modulator 112 modulates an information signal, from a symbol set representing data encoded for channel transmission, onto a carrier signal for transmission over a communication channel, such as a radio frequency channel" (Col. 4, Lines 7-11). Clearly, Cassia et al. are not concerned with channelization but instead teach enhancing communication by combining orthogonal signals into a composite signal that can be communicated over any "particular communications channel" (See, Col. 3, Lines 60-65).

Applicants respectfully disagree that "the function of transmitting two or more signals over a single frequency using orthogonal pulse shapes to reduce the amount of interfering between the signals is the same [as channelization]." For the reasons stated above, it is respectfully submitted that channelization is not the same as modulation regardless of how many information signals are used to perform such modulation. In other words, Cassia et al.'s use of orthogonal pulse shapes to modulate a first information signal coincidentally with a second information signal to produce a composite signal representing two or more data bits is not the same as channelization and that whether the two or more data bits correspond to a single information signal or to multiple information signals is immaterial.

It is respectfully submitted that that orthogonal pulse shapes represent one of the pulse types that can be used under the present invention. However, Cassia et al. use

different orthogonal pulse types as a method of modulation, the present invention can generate a code that defines a communication channel by specifying pulse types that are orthogonal. In fact, one skilled in the art would recognize that the Gaussian pulse, doublet pulse, and triplet pulse types disclosed on p.21, lines 4-9 of the present application are indeed orthogonal signals.

As with Rybicki et al., Cassia et al. teach a method that can be used on an available communications channel, where the communications channel is defined by the frequency of the carrier signal and not by a code, as required by the claimed invention.

Examiner contends that "it would have been obvious to one of ordinary skill in the art to modify the pulse shapes taught by Rybicki et al. and McCorkle et al. with Cassia's et al.'s teaching of using orthogonal shapes, since Cassia et al. suggest that the result of this modification would enhance the communication capability. The Applicants respectfully disagree.

Cassia et al. time coincidentally produce two orthogonal signals corresponding to two information signals where the two orthogonal signals are combined to produce a composite signal communicated over a frequency carrier. McCorkle et al. use coded pulses without a carrier signal while both Cassia et al. and Rybicki et al. use a carrier signal. It is respectfully submitted the three-way combination suggested by the Action is so unrelated, dissimilar, confusing and conflicting that one of ordinary skill in the art would not find any motivation for the combination suggested by the Action. In addition, the Action has not provided any basis for how such combination of carrier-based and

carrier less communication system could be enabled in a way that the combination can be made or used without undue experimentation.

In view of the above, it is respectfully submitted that all pending claims are now in allowable condition. Early issuance of a Notice of Allowance is respectfully solicited.

A request for the extension of time and a check in the amount of $55.00 is enclosed. Should any additional fees under 37 CFR 1.16-1.21 be required for any reason relating to the enclosed materials, the Commissioner is authorized to deduct such additional fees from Deposit Account No. 22-0261.

If the Examiner is of the opinion that the prosecution of this application would be advanced by a personal interview, the Examiner is invited to telephone undersigned counsel to arrange for such an interview.

Respectfully submitted,

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